

**Citation:**

Geleijnse JM, Kok FJ, Grobbee DE. Blood pressure response to changes in sodium and potassium intake: A metaregression analysis of randomised trials. *J Hum Hypertens*. 2003 Jul; 17 (7): 471-480.

**PubMed ID:** [12821954](#)

**Study Design:**

Meta-analysis

**Class:**

M - [Click here](#) for explanation of classification scheme.

**Research Design and Implementation Rating:**



NEUTRAL: See Research Design and Implementation Criteria Checklist below.

**Research Purpose:**

To assess the blood pressure response to changes in sodium and potassium intake using multivariate meta-regression analysis of randomized blood pressure trials.

**Inclusion Criteria:**

- Randomized design
- Adult study population (mean age of 18 years or above)
- Publication date after 1966.

**Exclusion Criteria:**

- Overlap with trial(s) already selected for the study
- Lack of blood pressure data
- Co-intervention from which the effect of sodium or potassium could not be separated
- Diseased study population
- Non-placebo-control group
- Less than two weeks of intervention
- A markedly outlying blood pressure reduction.

**Description of Study Protocol:**

**Recruitment**

- Trials were identified using tables and reference lists from meta-analysis papers and quantitative reviews
- A MEDLINE search was also used to identify publications of sodium and potassium trials

between January 1995 and March 2001.

## Design

Meta-analysis.

## Intervention

Sodium restriction or potassium supplementation.

## Statistical Analysis

- Pooled blood pressure estimates were obtained using meta-regression analysis weighted for trial sample sizes with adjustments for trial design, duration, age, proportion of males, initial blood pressure, initial urinary sodium and potassium excretion and change in urinary sodium and potassium excretion during intervention. A subset of trials were also adjusted for initial body weight and body weight change during the intervention
- Stratified analysis was also conducted for several variables (age, gender, hypertension status, initial body weight, initial sodium/potassium excretion and decrease in sodium/potassium excretion).

## Data Collection Summary:

- *Dependent variables:* Change in systolic and diastolic blood pressure (mmHg)
- *Independent variables:* Sodium reduction or potassium supplementation intervention
- *Control variables:* Age, proportion of males, initial blood pressure, initial 24-hour urinary sodium and potassium excretions and change in urinary sodium and potassium excretion during intervention.

## Description of Actual Data Sample:

- *Initial N:* 145 sodium trials and 47 potassium trials met inclusion criteria
- *Attrition (final N):* 40 sodium trials and 27 potassium trials (after applying exclusion criteria)
- *Age:* Median age (standard deviation) was 48 (15) years for sodium and 45 (12) years for potassium trials
- *Other relevant demographics:* The mean percent (SD) of men in the sodium trials was 61% (23%) and 60% (35%) for the potassium trials.

## Summary of Results:

### Key Findings (Potassium Supplementation)

Potassium supplementation was associated with a mean (95% CI) change in systolic blood pressure (SBP) of -2.42 (-3.75, -1.08) and a mean change in diastolic blood pressure (DBP) of -1.57 (-2.65, -0.50) using the full adjusted model weighted for trial sample sizes.

### Weighted Mean Blood Pressure Changes During Potassium Supplementation

Variables	Adjusted <sup>a</sup> SBP (95% CI)	Adjusted <sup>a</sup> DBP(95% CI)
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<b>Potassium supplementation</b>	-2.42 (-3.75, -1.08)	-1.57 (-2.65, -0.50)
Overall (30 strata)		
<b>Sodium supplementation</b>	-2.42 (-3.75, -1.08)	-1.57 (-2.65, -0.50)
Overall (47 strata)		

a: Adjusted for age, proportion of males, initial blood pressure, initial 24-hour urinary sodium and potassium excretions, and change in urinary sodium and potassium excretion during intervention.

### Other Findings (Potassium Supplementation, Stratified Adjusted Analysis)

- Blood pressure response was stronger in hypertensive vs. normotensive trial populations (SBP: -3.51 vs. -0.97mmHg, P=0.089; DBP: -2.51 vs. -0.34mmHg, P=0.074)
- Systolic blood pressure reductions tended to be increased at older age (-3.30mmHg for age older than 45 years vs. 0.01mmHg for age less than 45 years; P=0.11)
- Interactions with gender, initial potassium and sodium intake and size of the intervention were not statistically significant.

### Author Conclusion:

Reduced intake of sodium and increased intake of potassium could help to prevent hypertension, and especially reduce blood pressure in hypertensives.

### Reviewer Comments:

#### *Study Strengths*

- *Trials that altered both sodium and potassium intakes were excluded from the analyses*
- *Studies that assessed acute blood pressure changes after intervention were excluded (less than two weeks)*
- *Several stratification variables were used to assess effect modification*
- *Flow diagrams of selection of included trials are provided.*

#### *Study Limitations*

- *Missing data were imputed for some studies*
- *There is no statement about whether more than one author independently performed trial selection for inclusion in the meta-analysis and study data abstraction*
- *There were not enough studies available that assessed combined sodium-potassium intervention, and the interaction of these electrolytes might be important*
- *There is no summary table describing each individual intervention*
- *Search criteria for articles is not well described.*

### Research Design and Implementation Criteria Checklist: Review Articles

#### Relevance Questions

1.	Will the answer if true, have a direct bearing on the health of patients?	Yes
2.	Is the outcome or topic something that patients/clients/population groups would care about?	Yes
3.	Is the problem addressed in the review one that is relevant to nutrition or dietetics practice?	Yes
4.	Will the information, if true, require a change in practice?	Yes

### Validity Questions

1.	Was the question for the review clearly focused and appropriate?	Yes
2.	Was the search strategy used to locate relevant studies comprehensive? Were the databases searched and the search terms used described?	No
3.	Were explicit methods used to select studies to include in the review? Were inclusion/exclusion criteria specified and appropriate? Were selection methods unbiased?	???
4.	Was there an appraisal of the quality and validity of studies included in the review? Were appraisal methods specified, appropriate, and reproducible?	No
5.	Were specific treatments/interventions/exposures described? Were treatments similar enough to be combined?	???
6.	Was the outcome of interest clearly indicated? Were other potential harms and benefits considered?	???
7.	Were processes for data abstraction, synthesis, and analysis described? Were they applied consistently across studies and groups? Was there appropriate use of qualitative and/or quantitative synthesis? Was variation in findings among studies analyzed? Were heterogeneity issues considered? If data from studies were aggregated for meta-analysis, was the procedure described?	???
8.	Are the results clearly presented in narrative and/or quantitative terms? If summary statistics are used, are levels of significance and/or confidence intervals included?	Yes
9.	Are conclusions supported by results with biases and limitations taken into consideration? Are limitations of the review identified and discussed?	Yes
10.	Was bias due to the review's funding or sponsorship unlikely?	Yes